

# Phase III AMSAT

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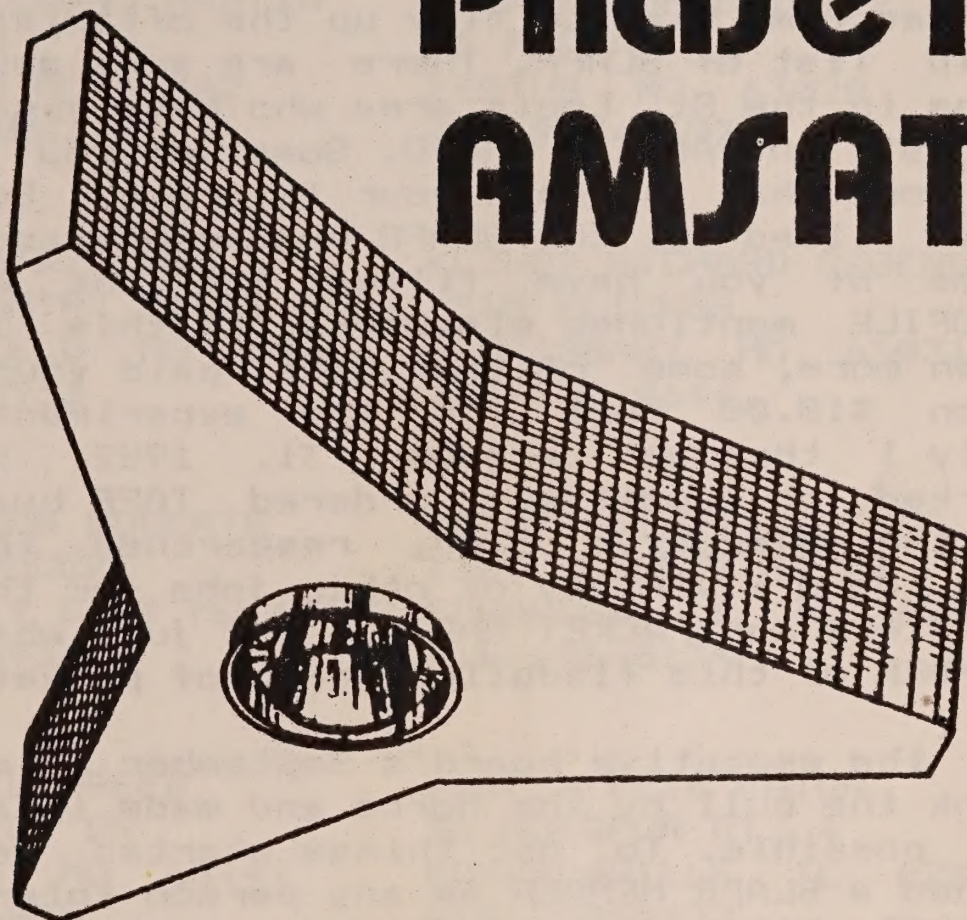
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"The lower (L1) frequency segment ...could be used for ASCII packet transmission ... The L1 segment would be used primarily for experimental data services such as those being pursued by AMICON... Several AMICON groups, those in San Francisco, Washington, D. C., New Jersey, Ottawa, Vancouver and in Sweden...could be linked together by a packet network utilizing the L1 segment."

from ORBIT, No. 10, page 5



## CONTROL

identifies the purpose of the packet

### SLAPR MEMBERSHIP

It has come time to tidy up the official membership list of SLAPR. There are some seventy persons in the St. Louis area who have expressed interest in PACKET RADIO. Some of you have done no more than indicate your interest. Some of you have filled out the SLAPR membership application. Some of you have filled out the MEMBERSHIP PROFILE mentioned elsewhere in this issue. And even more, some of you have paid your agreed-upon \$10.00 dues for the experimental period July 1 through December 31, 1982. Some have worked on committees, ordered TAPR boards, been on the executive board, researched frequencies and done a variety of other jobs for the benefit of SLAPR and PACKET RADIO. But just what makes a MEMBER of this fledgling group of packeteers?

At the executive board's September 11 meeting we took the bull by the horns and made it as simple as possible. To get things started we have defined a SLAPR MEMBER as any person interested in PACKET RADIO who has filled out the SLAPR APPLICATION and has his or her dues paid to date.

Now it seems that those two requirements ought to be easy enough to comply with. But friends, the truth of the matter is that when we went to the secretary's list of persons who have turned in an application form and to the treasurer's list of those who have paid their \$10.00 dues, we came up with a list of only 14 official SLAPR members.

On page 3 of this issue you will find a roster of members as of 9/11/82. If you're on the list, please check the data. If you're not on the list it may be that you have not had a chance to get things in order. If that is the case, do it now! Use the coupon on page 4. Send dues to Ed Dillon KA0AYD, at 14942 Country Ridge, Chesterfield, MO 63017. Do it now ! 73, Gus W9OFZ



SLAPR ROSTER

RICHARD MARTIN  
828 TESON  
HAZELWOOD MO 63042  
314-895-3881

WB0WRK TOM BRICKEY  
25 FLORA  
FESTUS MO 63028  
314-937-6697

KA0AYD ED DILLON  
14942 COUNTRY RIDGE  
CHESTERFIELD MO 63017  
314-532-5933

KL7HSY RICHARD PAGENDARN  
1315 FLICKER  
FLORISSANT MO 63031  
314-839-0644

N0DZI JOHN ROBERTS  
8219 BRADDOCK  
UNIVERSITY CITY MO 63132  
314-997-6936

KA9AKM SCOTT KUETHER  
1309 GLOUCESTER DR  
EDWARDSVILLE IL 62025  
618-656-8154

WD0ETZ BILL REED  
13263 AMIOT DR  
ST. LOUIS MO 63141  
314-878-6055

WB9FLW PETE EATON  
35 NORSPUR RT. 4  
EDWARDSVILLE IL 62025  
618-288-5432

KA0IXI SPENCER BRANHAM  
9926 LEWIS & CLARK BLVD  
ST. LOUIS MO 63136  
314-869-4761

KA9KAY LESLIE WELCH  
616 VALENCIA DR  
BELLEVILLE IL 62223  
618-528-5823

WA0KBU TOM VOGEL  
12 VILLE DONNA CT  
HAZELWOOD MO 63042  
314-739-4078

W90FZ GUS KUETHER  
1309 GLOUCESTER DR  
EDWARDSVILLE IL 62025  
618-656-8154

WB0TKL TOM NICHOLS  
3334 OXFORD  
ST. LOUIS MO 63143  
314-647-8994

KD9S LEONARD PARIS  
442 CARLYLE EAST  
BELLEVILLE IL 62221  
618-277-4927



## GATEWAY

### EATON VIDEO TAPE OF TAPR MAKES PROGRAM FOR MVFMA

The FM SCANNER (newsletter of the Miami Valley FM Association) heralds, "NEXT MEETING...Following a short business session, a video tape produced by the St. Louis Area Packet Radio group will be shown." The DIGINEWS column also says, "Each TAPR chairman briefly discribed his area (software, hardware, networking, protocol, etc.) in non-technical terms. The tape is informative, entertaining and of professional quality throughout." Congrats, President Pete! Good job!

FCS

to verify that the packet is received correctly

You have received three issues of SLAPR PROTOCOL. It is time to review the list of persons who do really want to continue sharing with SLAPR. FCS is to correct errors. We would like to correct our mailing list. Please help us. Do you want to continue receiving SLAPR PROTOCOL? If you are a member of SLAPR you will automatically continue to receive your monthly issue. If your not a member, here's another chance. Members, please correct any errors in the information we have on you, or add info. Please fill out the following:

\*\*\*\*\*clip here and mail today\*\*\*\*\*

NAME -----CALL-----

ADDRESS -----

CITY-----STATE---ZIP-----

PHONE ----- (home) ----- (work)

DUES INCLUDED?-----\$10.00 6/1 through 12/31/1982



## SLAPR ACTIVITIES

### LAN PROPAGATION TEST

The LAN committee calls all SLAPR members to test the propagation possibilities in the St. Louis area. The SLAPR Propagation Test will be take place on 145.050 MHz on Sunday, September 19, at 8:30 pm. NCS will be Les, KA9KAY, located near the intersection of Il 15 and 13 on the bluff line in the west of Belleville. Check-ins to the net will be taken in the following groups:

suffixes beginning    A - D  
                              E - I  
                              J - L  
                              M - P  
                              Q - Z

The purpose of the test will be to see how all stations can hear each other, and the net control station. It will also help us decide where to locate the digipeater(s).

Please direct any ideas of comments on our organizing a Local Area Network to

Les Welch    KA9KAY  
616 Valencia Drive  
Bellevillle, Il 62223  
618-538-5823

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The program for our September 27 meeting will be presented by W9MXC, LARRY ROBERTS and W0SL, ROY WELCH. They will discuss AMSAT PHASE IIIB. The PHASE IIIB satalite is scheduled to have a Special Service Channel for digital communication like PACKET RADIO. They will explain what a GATEWAY STATION is and how it can apply to SLAPR.



## GATEWAY

station to access long distance communications

### BETA BOARD DELIVERY SCHEDULE

Dear Pete,

I'm writing to let you know our current BETA test status. As you probably remember, the Beta Test window given in the last (and first!) PSR was mid-August through September. This was based on estimates made as conservatively as possible at the time. As usual in design projects involving a number of people, the unexpected should be planned for (an old Irish proverb). Suffice it to say that a careful re-evaluation of both the hardware and the software status has left us with a revised window, a window that has slipped from the prior one. I want to present in this letter our latest schedule, so you will know all our current plans. I hope that you will be able to discuss this with everyone in your local group so that they all will be in the picture. It is very important that your members realize that missing deadlines is as annoying to us as it is to them, and that it was with the greatest reluctance that we accepted the necessity for slipping the schedule. Here is our new schedule:

#### ALPHA TEST:

Alpha test is nearing the time when boards will be on the air running full protocol instead of developmental software.

#### ITEM

#### COMPLETION DATE

FORTH system and TAPR software onto EPROM: (currently the TAPR software is sitting in POINT-4, and the FORTH has not been target compiled for an Apple. These are the primary tasks.)	Prior to 8/21
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6809 plug-in boards populated: Prior to 8/14  
(These allow 6809 operation on a board designed for the 6502. Beta Test does not need these, as the 6809 is designed into the board from the beginning.)

Apple system development stage 3 weeks  
involving port interface  
interrupt drivers  
CSMA protocol  
debug 4-6-weeks  
diagnostics

### BETA TEST:

During these Alpha Test activities Beta Test will be proceeding according to the following schedule:

Schematics, filter design, Prior to 8/21.  
6809 mods

CAD -- estimate and artwork 3-6 weeks  
(This estimate reflects the unfortunate fact that time is money in the computer aided design field: We have allocated no more than \$10 for this item (see below) and as a result we may not be at the top of the heap at the CAD house).

Boards fabricated according to 2-3 weeks  
above design

Boards populated 2 weeks

Boards tested and shipped 1-4-weeks

This completes the Beta schedule. If you add up all the times above you get a delivery window of 10/16 - 11/26. We have tried to be as conservative as possible in our current estimates.

The other big item which is getting



straightened out is the final cost to your site for these boards. Since prices fluctuate, and some of the numbers below are educated guesses made by people who have paid for such services in the recent past, please consider the itemized list below to be subject to revision. With this disclaimer out of the way, here is how we see the board costs:

	ALPHA	BETA
terminal node controller	\$150	\$125 - \$150
6809 modification	25	0
cables	< 10	< 10
connectors	< 10	< 10
off-board hardware	< 15	< 5
instruction manual	0	5
manufacturing costs	0	< 10
CAD costs	0	< 10
TAPR costs	0	< 10
PC fabrication costs	0	< 2
TOTAL	\$215	\$197 - \$222

I should mention that item "terminal node controller" includes all hardware costs for on-board components, prior to assembly. "Manufacturing costs" have been estimated on the basis of discussions with the company which will be handling the production and distribution of the boards, and finally, "TAPR costs" include things like our costs for printing services, etc., over and above what can be covered by your membership fees.

I hope this information gives you a feel for our end of the project. Please don't hesitate to write or call me (or anyone else in the local group for that matter) and if you have members at your site who would like me to talk to them, please let me know.

Sincerely,

Dan Morrison, KV7B



**- LATE BREAKING NEWS -**

SLAPR PROTOCOL just recieved its first " Letter to the Editor " from Lyle Johnson WA7GXD in Tucson, unfortunately the Editor is out of town and has left me the responsibility to get the completed newsletter in the Mail just as Lyles letter arrived. Since Lyle went to some expense to get us this letter on time, ( no thanks to the U. S. Snail who delivered it late on Sunday instead of early on Saturday ) I felt it was worth " holding the presses " long enough to squeeze it in. But since the rest of the newsletter was already pasted up I had to figure out a way to do it, so Ive decided to run SLAPR's first centerfold.....congratulations Lyle and Thanks!

Pete







TAPR  
PO Box 22888  
Tucson AZ 85734  
09 September 1982

To the Editor:

Congratulations on the formation of SLAPR, as well as the surprisingly fast organization of "SLAPR Protocol"! We in Tucson are greatly encouraged by your enthusiasm... When you are heavily involved in a large developmental project, and a volunteer one at that, the kind of support that SLAPR is rendering plays a larger part than you likely realize!

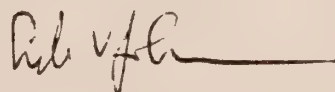
BETA is coming... please be patient! In the last several weeks we have made some major revisions to the ALPHA TNCs: changed the UP from a 6502 to a 6809; added a switched capacitor filter to clean up radio distortion of the MODEM signals; modified the "front-end" of the MODEM input circuitry; and discovered an undocumented "flaw" in the WD 193X HDLC controller chip, necessitating a change in the CWID circuitry.

The software has been downloaded from a POINT-IV computer to an APPLE for target-compilation, and should be ready soon. The schematic is being evaluated by the local CAD group for PC artwork generation. A lot of valuable data has been gathered on parts and reliability factors on the TNC. A number of 2-meter radios have been successfully interfaced to the TNC and exercised on-the-air at 1200-baud. Things ARE happening here!

Those of you that have joined TAPR will be pleased (?) to note that your membership cards have been delivered by the printer, and when our publicity chairperson and Beta test coordinator complete the move into their new house, they will be sent to you, along with the October issue of TAPR's "Packet Status Register".

Enough news for now. Keep up the interest, and get ready for BETA...

Best 73's



Lyle Johnson WA7GXD  
TAPR Executive VP  
Hardware Chairman







## GATEWAY

station to access long distance communications

### connect DESIGN STRATEGY FOR PHASE III

The TAPR Microwave Committee, headed by Dr. Mike Parker, KC7GD, has settled on a design strategy for the AMSAT phase III L-band linear amplifier development effort in Tucson. An Arizona-based corporation is donating to TAPR the required transistors to create an all solid-state amplifier in the 20-40 w class, using L-band pulse-power transistors.

Following receipt of the devices and ancillary components, an initial set of prototypes will be built and tested with equipment recently acquired for TAPR by Mike. The schematic, board layout and design/implementation notes will be released when available.

disconnect KD2S, DEN

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"AMICON, the AMSAT International Computer Network, will be another user of the Phase IIIB Special Service Channels. Some of the possibilities of AMICON, using SSC L1, include establishment of two-way computer links, computer networks packet radio gateways for long haul traffic and even digitalized voice and video.

"Individuals and groups of Radio Amateurs interested in serious scientific research could use Phase IIIB to perform meaningful experiments coordinated through Scientific Program Managers in the various countries around the world."

by Rich Zwirko, K1HTV and  
Bob Ruedisueli, W4OWA  
from ORBIT No. 10



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## DATA

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the field that contains the message being sent

connect        PACKET PRIMER

My compilation of the SLAPR MEMBERSHIP SURVEY that you filled out indicated that we have a wide variety of 2 meter transcievers that we will have to interface to the TNC boards here. The survey shows the following types and quantities.

ICOM	IC2AT	(2)	ICOM	IC22S	(3)
ICOM	IC25A	(1)	ICOM	IC255A	(2)
KENWOOD	TR2500	(1)	KENWOOD	TR7400	(2)
KENWOOD	TR7730	(1)	KENWOOD	TR9130	(1)
KENWOOD	TS700A	(2)	KENWOOD	TS7600	(1)
REGENCY	HR212	(2)	REGENCY	HR212	(1)
REGENCY	HR2MS	(1)		w/synthesizer	
YAESU	FT200R	(1)	YAESU	FT202R	(1)
YAESU	FT207R	(1)	YAESU	FT208R	(2)
YAESU	FT221R	(2)	AZDEN	3000	(2)
TEMPO	VHF1	(1)	TEMPO	ST1	(1)
	w/synthesizer		HEATHKIT	2032	(1)
WILSON	1402	(1)	MIDLAND	2MTR	(1)
SANTEC	HT1200	(1)	KDK	FM2016A	(1)

Lyle Johnson, TAPR HARDWARE chairman, has gone to significant efforts to make the TNC easy to interface with almost any radio. Lyle indicated to me that they have already connected an ALPHA board to the Azden FCS2000, Kenwood TR7400, ICOM IC211, and the Yaesu FT227R with "no problems." They have also successfully interfaced a Yaesu FT208R and a ICOM IC2AT on receive only. They haven't attempted the transmit on those two radios yet.

The simplest interface and the one most of us will use is a four wire interface: 1. transmitter push to talk, 2. audio in from your radio's speaker, 3. audio out to your radio's microphone input and 4. ground.

The push to talk transmitter control line interface is designed to pull a positive voltage to



ground for transmit. This is implemented on the TNC board through a Darlington transistor pair able to pass a total of 1 amp. This line also has clamping diodes for spike protection. For anything greater than 14 volts Lyle recommends an external mercury wetted relay.

The audio signal from the TNC board is generated by the XR2206 chip which has an output impedance of approximately 600 ohms. This signal is then buffered by an op amp to provide an effective impedance of nearly zero to drive most radios. The XR2206 has an internal level adjustment. An external 10 turn trimpot will enable the buffer output to be adjusted from a couple of millivolts to over 3 volts peak to peak. Lyle indicated that an easy to adjust this is to initially set the level at minimum and gradually increase the level while listening to the transmitter output on a second receiver. He has tried this with several radios with good success.

On the receiver side, the audio from the speaker is limited by back to back LEDs. Simply increase the audio until the LEDs just start to flicker. This adjustment is apparently not critical and on some tests Lyle found that full range on the radio volume control still provided "good copy".

A recent change in the TNC board was the addition of a 4 pole switched capacitor filter on the audio input. Lyle indicated that his experimentation showed most radios have an audio response of 800-1400 Hz with significant attenuation at 2200 Hz. This filter (a National MF10CN) compensates for that attenuation. The filter characteristics are programmed using 8 resistors on a 16-pin dip header. To change the filter characteristics for your radio, simply change the resistors. For all the radios tried so far, the filter characteristics have been the same.

It seems to me that Lyle has done a fine job defining this interface and made a reasonable attempt to make it as "universal" as possible.

disconnect Bill, WD0ETZ



identifies the beginning or the end of a packet

This month I am relinquishing my real estate in this column to David Borden, KBMMO. Dave is the monthly columnist in QEX and AMRAD NEWSLETTER telling folks around the country the latest info on PACKET. I feel his comments are excellent "food for thought" as very soon we will be in the very same situation he addresses in this month's DATA COMMUNICATION column of QEX. My thanks to Dave and QEX for allowing us to reprint his remarks.

"While my various data-communications-oriented friends around the country debate the best way to internet our various metropolitan networks (MANs), I cast about for some programming that I could do without wasting effort on code that might be thrown away with the next network conference decision. The East Coast seems to be firming up on AX.25 (Amateur X.25 Protocol) for the metropolitan area networks. The Tucson Amateur Packet group is using an implementation of IEEE 802 (another MAN standard) and promise to do an X.25 interface. So, I looked toward applications. Our local MAN lacked a computer. When a computer is available to users of a MAN, it is referred to as a host. Each user attaches his terminal to a packet assembler/disassembler (PAD) alternatively called a terminal node controller (TNC). The user establishes a virtual connection to the host computer and computes. What could he accomplish by doing this?

"Applications for a Host Computer

1. Mailbox (leave a message for someone who will pick it up at some later time)
2. Games (play a game with the computer, such as Adventure, Chess, Monopoly, Space Paranoids, etc.)
3. Teleconference (hold a roundtable digital QSO while editing a document)



4. Calculate (run a program to figure antenna dimensions or propagation of active filter component values or whatever)

5. User Competition (a game between users in which the computer acts as a scorekeeper only or provides the rules and game setting acting as referee)

6. Simulation (users activate the computer to load the MAN with packets at some given rate simulating many independent QSOs and then users change their protocol time delay parameters to maximize thruput)

7. Data Bank Access (computer provides large storage of desirable data)

"It appears I had a reasonable idea since I could demonstrate some of the above applications using just my normal hamshack computer, an S-100 system with dual floppy disk drives. I would connect the computer to my PAD (running slightly modified Vancouver software) and let users of the local MAN test the system.

"There also appeared a local opportunity to demonstrate packet radio technology to uninitiated civilians at a local community get-together. There would be normal ham radio activities (voice communications on hf) and just dualogue (two amateurs engaged in digital communication) seemed a rather mundane demonstration. It was suggested that if my S-100 computer could be running an Adventure program, a packet station at the demonstration site could play the game remotely. This seemed an interesting challenge, so I proceeded to connect my S-100 computer to my PAD.

"From our San Francisco friends, host software was provided by an assembly time option. By setting a software switch True, the Vancouver PAD software allowed communication with a computer on the terminal side. Where you would normally connect a terminal, you connected a cable to a serial port on your host computer. RTS (request to send) and CTS (clear to send) handshaking sig-



nals are required (normally not required for terminal connection to the PAD). I examined the software to observe what made a host different from a terminal.

"First, I removed the sign-on message normally printed on the user's terminal at reset time. My host computer did not desire to see any sign-on trivia about the version of software. Next, I removed the dialogue between the user and the PAD concerning the cw i-d speed. The line (modem side) would always be 1200-baud, so only one cw i-d speed would be required. While I was changing everything, I turned the echo off. My host computer knows what it sent and needs no reminder

"Then I encountered the code provided by Hank Magnuski, KA6M, to handle the host mode. It concerned the packet terminator.

"Normally, under the Doug Lockhart (VE7APU) design, packets are terminated by a line feed character being typed at the terminal. Under the modifications added by Calvin Teague, K6HWJ, a carriage return may be caused to automatically be followed by a line feed and thus none need be typed on the terminal. But, if a host computer is doing the sending requiring packetizing by the PAD, then a packet must be terminated every time the computer program running in the host expects user input (we must remember here where the user is - at the other end of this link). For example, I run the CP/M operating system. It expects input after the output of a forward arrow (>). So a forward arrow must be a packet terminator. Various CP/M utility programs expect input after a colon (:), or a question mark (?), so they must be added to the terminator list. These new terminators were added to the list by Hank and cover most situations. If the computer is expecting input from the user and none is received because the prompt from the computer did not terminate a packet which the user did not get to know he needs to supply input, we have a Catch-22 situation.



"These changes were made by assembly time switch option and new FROMs were burned for my FAD the day before the demonstration. Some testing was done, but no stress testing was possible to simulate the conditions of the demonstration (does anyone ever stress test prior to the required working of a device?).

"The demonstration worked, but several drawbacks were noted. When the rf link was good, the host hookup worked well. When the link degraded, the wait for an answer from the host took forever to get across. The 1200-baud link speed was too slow.

"Normally, if more than 128 characters are sent from the terminal, a packet is terminated and a new one begun. For the host mode, that limit was lowered to 64. It appears a good number might be 5. More experimentation needs to be done in this area.

"It should appear to the user that no hardware is between the user terminal and the host computer. Possibly the way to do this is to set a timer in the FAD so that if no character is received for two character times, a packet should be terminated.

"A word should be said for the other digital users on the channel where a user-host virtual circuit exists. The San Francisco group has a lot of experience in this area. Basically the host hookup hogs the channel, even given the time-division multiplex aspect of packeterring. The timers of the FAD (delay before transmit when channel clear) should be experimented with to allow the Dialogue users to coexist with the host users on a given channel. Increasing the speed would help."

from DATA COMMUNICATIONS  
by David Borden  
QEX September 1982



SLAPR PROTOCOL  
ST. LOUIS AREA PACKET RADIO CLUB  
1309 GLOUCESTER DR.  
EDWARDSVILLE, IL 62025

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\* \*  
\* DON'T FORGET \*  
\* SLAPR PROPAGATION TEST \*  
\* SUNDAY, SEPTEMBER 19 \*  
\* 8:30 PM - 145.050 MHZ \*  
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# NEXT SLAPR MEETING

"AMSAT-OSCAR PHASE IIIB & PACKET"  
7:30 PM ON SEPTEMBER 27, 1982  
GRAND TETON ROOM, 7TH FLOOR  
DEACONESS HOSPITAL  
6150 OAKLAND, 40 AT HAMPTON  
ACROSS FROM FOREST PARK  
ST. LOUIS, MO

KAGM  
HANK MAGNUSKI  
311 STANFORD AVE  
MENLO PARK, CA 94025

